UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2016/2017
BACHELOR'S DEGREE (BSC)	ENERGY ENGINEERING
SUBJECT	NUMERICAL METHODS FOR ENGINEERING
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	10657-Attività formative affini o integrative
CODE	00650
SCIENTIFIC SECTOR(S)	MAT/08
HEAD PROFESSOR(S)	FRANCOMANO ELISA Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**FRANCOMANO ELISA** Tuesday 09:00 11:00 Ed.6- Stanza 2

DOCENTE: Prof.ssa ELISA FRANCOMANO

PREREQUISITES	To be successful in the course, a background in geometry, mathematical analysis is required.
LEARNING OUTCOMES	At the end of the course the student will gain knowledge on the numerical and mathematical methodologies in the applied science, will be able to identify the mathematical and discrete modelling of the problem, to characterize efficient methods in problem solving and to define logical schemes for the automatic execution. The student will able to adopt the numerical tools for the error analysis, the solution of linear systems and definite integrals, approximation of functions; will be able to discern the well-conditioned of a problem, the numerical stability of the algorithm and the computational complexity. The student will be able to define and formulate efficient algorithms, to choose among the various methodologies the most suitable for the problem in use and to explain the computational results and the mathematical solver adopted. Moreover, the student will be able to design computational schemes for various problems of the applied sciences. A written test and oral examination will asses the knowledge, comprehension and ability skills.
ASSESSMENT METHODS	Written and oral tests. Grades are awarded on a scale from 18 to 30. The written test concerns the proposed contents provided during the course. The oral examination can be accessed if the written test is passed with a grade equal or more than 18/30. The final grade will be based on the following evaluation criteria: 60%: written test: assessment of the computational tools employed in the problem solving and evaluation of the final results. 30% oral test : knowledge and understanding of the methodologies covered in the course. 10%: technical language and expertises, mathematical accuracy and logical-deductive skills.
EDUCATIONAL OBJECTIVES	The student will gain the mathematical foundations of well-established numerical methods and will be able to adopt them for a wide range of scientific and engineering disciplines. The student will be able to discuss about the methodology adopted in relation to the theory covered in the course.
TEACHING METHODS	Lecturers in class and class work.
SUGGESTED BIBLIOGRAPHY	Materiale didattico fornito dal docente. S. De Marchi, Appunti di Calcolo Numerico, Esculapio

SYLLABUS

Hrs	Frontal teaching
5	The role of numerical methods in engineering problem solving. Floating point arithmetic. Truncation and round-off errors. Error propagation. Conditioning and numerical stability. Computational complexity.
8	Data fitting. Interpolation. Numerical derivatives. Computational skills of the proposed numerical methods.
8	Least square regression. Polynomial regression. Fourier approximation. Fourier series. Discrete Fourier transform. Fast Fourier Transform. Computational skills of the proposed numerical methods.
5	Numerical integration. Nodes and weights. Accuracy. Computational skills of the proposed numerical methods.
10	Linear algebraic equations: direct and iterative methods. Computational skills of the proposed numerical methods.

Hrs	Practice
18	Exercises and application of the proposed numerical methods. Discussion of the final numerical results.